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DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

ENGINEERING AND PRODUCTION BRANCH

FAA DEPOT STANDARD

SERVICING STANDARDS AND TEST REQUIREMENTS FOR GROUND ELECTRONIC EQUIPMENT

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1. SCOPE

1.1 Scope.- This standard establishes (as applicable) the acceptable workmanship criteria and test requirements for equipment intended for use by the Federal Aviation Administration facilities.

1.2 Purpose.- To define those workmanship and test requirements not normally covered in subsidiary specifications or drawings. It provides clearly defined statement of work requirements that takes into account the degree of servicing and testing to be accomplished by a contractor in ground equipment repair transactions. It provides the basis for a common ground of understanding between a contractor and the FAA Depot regarding work and testing to be accomplished during Level A servicing. It is not intended to supersede any of the provisions of the contract or applicable specifications and drawings considered a part of the contract. Where actual conflict exists, the provisions of the contract or applicable specifications or drawings shall take precedence over the requirements herein.

1.3 Definitions.-

1.3.1 Item.- That which is shipped from an FAA field facility to the FAA Depot for servicing.

1.3.2 Equipment.- A complete set of units in a facility which has the capability of performing all the prescribed functions of that facility, such as a radar system, VOR, or TACAN.

1.3.3 Unit.- A complete operating assembly within an equipment, such as a transmitter, receiver, or antenna.

1.3.4 Component.- A complete self-contained element or assembly within a unit which performs a specific function necessary to the satisfactory operation of the unit, such as a STALO, meter panel, or antenna pedestal.

1.3.5 Subassembly.- A structural element of an item secured by fasteners or other mechanical means, upon which are mounted one or more electronic and/or mechanical parts, in accordance with the following:

Item	Subassembly
Equipment	Unit
Unit	Component
Component	Parts Assembly

1.3.6 Minimum disassembly.- Removal or opening of any of the shielding devices of an item such as panels, covers, doors, or lids to permit access to protected electronic and/or mechanical parts.

1.3.7 Partial disassembly.- Removal of one or more, but not all, of the subassemblies of an item and/or any dismantling necessary to permit access to all electronic and/or mechanical parts of the subassembly(ies).

1.3.8 Complete disassembly.- Removal of all the subassemblies of an item and/or any dismantling necessary to permit access to electronic and/or mechanical parts of an item.

1.3.9 Servicing Level A.- Normal servicing level for items, with partial disassembly. This level is used to service items not requiring an appearance and performance equivalent to that of a new item except as specified in paragraph 3.3.

1.3.10 Part-peculiar.- Any item (part, subassembly, assembly, unit, etc.) designed, developed, altered, assembled, or fabricated by the contractor or his vendor specifically for use with the particular equipment.

2. APPLICABLE DOCUMENTS

2.1 FAA documents.- The following FAA documents of the issue in effect on the date of the invitation for bids or request for proposals, form a part of this standard and are applicable to the extent specified herein.

AC Form 4680-2 E&R Quality Feedback Tag

FAA Form 6032-1 Airway Facilities Modification Record

FAAD-R-1139 Printed Circuit Boards

2.2 Military documents.- The following military document of the issue in effect on the date of the invitation for bids or request for proposals, forms a part of this standard and is applicable to the extent specified herein.

MIL-C-45662 Calibration System Requirements

NOTE: Single copies of military specifications may be requested by mail or telephone from U. S. Naval Supply Depot, 5801 Tabor Avenue, Philadelphia, Pennsylvania, 19120 (for telephone requests, call 215/697-3321, 8 a.m. to 4:30 p.m., Monday through Friday). Not more than five items may be ordered on a single request; the Invitation for Bid or contract number should be cited where applicable.

3. REQUIREMENTS

3.1 General repair requirements.- The item, including all parts and accessories, shall be serviced in a thoroughly workmanlike manner. Particular attention shall be given to neatness and thoroughness of soldering, marking of parts and assemblies, wiring, welding and brazing, plating, riveting, finishes, machine operations, screw assemblies, and freedom of parts from burrs and sharp edges or any other damage or defect that could make the item unsatisfactory for the operation or function intended. Printed circuit boards (PCBs) shall be repaired in accordance with specification FAAD-R-1139, except that the replacement coating referred to in 3.3.9 shall be equal to the coating which was removed. The repaired equipment shall perform the function for which designed or modified, and meet all the test requirements herein.

3.2 Specific repair requirements.- The following specific repair requirements shall be accomplished as applicable to individual items.

3.2.1 Repairing.- Trouble-shoot, visually and with the aid of test equipment, replacing obviously defective or questionable parts revealed by a partial disassembly of the item made necessary to correct troubles and/or incorporate authorized modifications.

3.2.2 Cleaning.- Remove all dust, grease, or corrosion from the item, chassis, subassemblies, and parts. Parts shall be cleaned of smudges, loose, spattered, or excess solder, metal chips, or any other foreign material which might detract from the intended operation or function of the equipment. All corrosive materials shall be removed. Whenever possible, this cleaning shall take place before the parts are assembled into the item. Cleaning processes shall have no deleterious effect on the item or parts.

3.2.3 Refinishing.- Sand, prime, and touchup all marred surfaces revealed by a partial disassembly, closely matching the original color. Touchup silk screening, engraving, diagrams, circuit symbol designations, etc., to a readable condition.

3.2.4 Electroplating.- Apply plating finishes to parts surfaces or contacts revealed by partial disassembly only as necessary to stop pitting or corrosion of base metal and to meet the item performance requirements.

3.2.5 Modifying.- Incorporate all standard approved modifications. Remove all nonstandard modifications revealed by partial disassembly. FAA Form 6032-1, Airway Facilities Modification Record, (to be provided by the government), shall be used to document the installation and the removal of all modifications to FAA equipment. If a field-prepared FAA Form 6032-1 is received by the contractor with the equipment, it shall be updated and returned with the repaired item. The form shall be completed and attached to the AC Form 4680-2 (see 3.2.22) on each equipment by the contractor. The following information shall be entered on the form:

Blank Heading	Information
DESCRIPTION OF ITEM	Equipment manufacturer's name and part number
SERIAL NUMBER	Serial number of equipment
FAA TYPE DESIGNATION	FAA type number when assigned
CODE	The letter "N"
TITLE OR DESCRIPTION	The notation "N/A"

NOTE: Parts peculiar, required for installation of modifications, will be furnished by the FAA Depot when specified in the contract.

3.2.6 Mounting of parts.- Parts, components, or hardware, etc., shall be assembled and secured or mounted in a manner equal to the item's original manufacture. Items having missing, inoperative, defective, bent, broken, or otherwise damaged parts will not be acceptable.

3.2.7 Mounted hardware installation.- The installation of hardware parts, such as hinges, catches, handles, knobs, etc., shall be accomplished in such a manner as to avoid damaging the hardware or the mounting surface.

3.2.8 Threaded parts or devices.- Screws, nuts, bolts, etc., shall show no evidence of cross-threading, detrimental or hazardous burrs, or mutilation.

3.2.9 Tightness.- All screw or bolt-type fasteners shall be tight. The word "tight" means the screw or bolt shall be firmly secured and that there shall be no relative movement possible between the attached parts.

3.2.10 Riveting.- The riveting operation shall be carefully performed in order to assure that rivets are tight and satisfactorily headed with the rivet heads tightly seated against their bearing surface.

3.2.11 Gear assemblies.- Gear assemblies shall be properly aligned and meshed and shall be operable without interference, tight or loose spots, excessive backlash, or other irregularities that could cause unsatisfactory operation.

3.2.12 Bearing assemblies.- Bearing assemblies shall be free of rust, discoloration, and imperfections of ground, honed, or lapped surfaces. Particular attention shall be given to contacting surfaces which shall be free of tool marks, gouges, nicks, or other surface-type defects. There shall be no detrimental interference, binding, or galling.

3.2.13 Wiring and cabling.- Wiring and cabling shall be neat and sturdy. Insulated wire running between equipments or subassemblies within an equipment, such as between drawers or chassis and module subassemblies, shall be formed into cables or ducted wherever practicable. Wires and cables shall be positioned or protected to avoid contact with rough or irregular surfaces and sharp edges.

3.2.13.1 Wire dress or cabling.- Wire dress or cabling shall not result in improper electrical operation or interference with mechanical operation that will lead to subsequent damage of the wire or cable.

3.2.13.2 Lacing of cable.- Lacing of cable shall be neat in appearance. The lacing shall be applied firmly, yet not with excessive pressure which would cut into conductor insulation.

3.2.13.3 Cabling or wiring harnesses.- Cabling or wiring harnesses shall be properly anchored to avoid damage to conductors or to parts adjacent to the cable harness.

3.2.14 Insulation.- Remove and replace all wires where insulation shows evidence of burns, abrasion, pinch marks or deterioration that could cause short circuits or leakage.

3.2.15 Splicing.- Wires in a continuous run between two terminals shall not be spliced during the assembly of the equipment except where a stranded conductor is spliced to a solid conductor and the two are supported at the splice.

3.2.16 Clearance.- The clearance between wires or cables and heat generating parts, such as electron tubes, resistors, etc., shall be such as to avoid deterioration of the wires or cables from the heat dissipated by these parts under the specified service conditions of the equipment.

3.2.17 Shielding.- Shielding on wires and cables shall be secured in a manner which will prevent it from contacting or shorting exposed current-carrying parts. The shielding shall terminate at a sufficient distance from the exposed conductors of the cable to prevent shorting or arcing between the cable conductor and the shielding. The ends of the shielding or braid shall be secured against fraying.

3.2.18 Welding.- The joining surfaces of all parts to be welded shall be cleaned of all foreign matter such as rust, scale, paint, and grease. All welds shall be free of harmful defects such as cracks, porosity, undercuts, voids and gaps.

3.2.18.1 Quality.- There shall be no burn-through or incomplete penetration of filler metal in the joint. Fillets shall be uniform and smooth. Fusion shall be complete and adequate.

3.2.18.2 Alignment.- There shall be no excessive angular or thickness misalignment, warpage, or dimensional change due to heat from the welding operation.

3.2.18.3 Spot welding.- Spot welding shall be adequate to provide the required strength.

3.2.19 Soldering.- No cold solder joints will be permitted. All solder connections shall be neat and in accordance with the highest degree of good electronic work. Solder connections which are not neat in appearance, have incorrect connections, or have excess solder on the terminal, shall be reworked.

3.2.19.1 Soldered connections.- All wire connected to solder-type terminals shall be fastened by crimping the wires on the terminals prior to soldering so that the solder is not depended on for mechanical strength. This requirement shall not apply to cup-type terminals, such as are found on AN-type cable connectors, nor to other specialized soldered joints, such as are used in assembling coaxial connectors, where crimping is unsuitable. Solderless type wire lugs shall be crimped on the wire using a tool and method approved by the lug manufacturer.

3.2.19.2 Extension pigtails on wire-mounted components.- The wire leads of resistors, capacitors, and similar components mounted on insulating terminals shall extend out from the soldering terminals sufficiently to allow the leads to be gripped by long-nose pliers, except where not practicable. In order to assure that leads and wires are mechanically secured to their terminals before soldering, the leads shall be wound around the terminals 1½ turns, except that as little as one turn may be used where 1½ turns are not practicable. All pigtails shall be cut off evenly and shall present a neat appearance.

3.2.20 Replacement parts.- Replacement parts shall be as specified in the equipment instruction book parts list or a part approved by the equipment manufacturer. When the foregoing described parts are not readily available or are uneconomically practical to obtain, another part may be used provided it has equal or better electrical and mechanical properties and is physically interchangeable with the parts list part. When an interchangeable part is not readily available or is uneconomically practical to obtain, the contractor shall select a substitute part suitable for the intended use and request approval to use the part from the FAA representative or contracting officer.

3.2.21 Adjusting and calibrating.- Make the mechanical and electronic adjustments and calibrations required by current specifications or other authorized documentation for item tuneup or alignment.

3.2.22 AC Form 4680-2.- This form shall be completed and attached to each repaired equipment by the contractor prior to delivering the item to the FAA. The following information shall be entered on the form:

Blank Heading	Information
FSN (or NSN)	Equipment national supply number (NSN) which appears in the contract
NOUN	Equipment manufacturer's name and part number
DATE	Date equipment repair is completed
SERIAL NUMBER	Serial number of equipment
REPAIRED BY	Contractor's name
P.O. or CONTRACT NUMBER	Contract number if assigned, otherwise, purchase order number

3.3 Test methods.- The contractor shall prepare the necessary list of tests, acceptance test procedures, and test data forms. Test procedures shall be complete and in sufficient detail to permit evaluation of their adequacy in demonstrating compliance with performance requirements as specified in the contract without recourse to physical examination of the test facility. Test procedures shall include block diagrams of the test setup identifying all connection points, test points, and controls. Supplementary descriptive information shall be furnished on any special test equipment or fixtures utilized in the test and shall include drawings, theory of operation, and analysis of measurement accuracy, as appropriate. The test procedure and data forms shall provide for the recording of all observed data and all intermediate steps or mathematical calculations which may be involved in determination of the final measurement. All data shall be quantitative and each final entry shall be in units directly comparable to the specification limits.

3.3.1 Approval of test methods.- Four copies of the proposed list of tests, test procedures, and blank test data forms shall be furnished to the government as follows: three copies to the contracting officer or his designated technical representative, and one copy to the resident FAA quality assurance representative, if assigned, otherwise forwarded to the FAA contracting officer or his designated technical representative. Copies shall be furnished at least 20 days in advance of the contractor's scheduled date for testing to allow the government time to review and evaluate. One copy will

be returned to the contractor, either with a statement that the proposed methods and forms are approved by the government for use by the quality assurance representative, or with a statement pointing out deficiencies to the proposed methods and forms. In the event of the latter, the contractor shall resubmit his revised methods and forms. The approved forms shall be used for preparation of the test data sheets for the testing of all items on the contract.

3.3.2 Testing.- On all items, the contractor shall perform all of the required tests utilizing the government-approved test procedures and furnish test data on the approved forms as specified in 3.3.3. The test data must substantiate that the item meets contract requirements and shall include the statement, "This certifies that this item fully meets all technical requirements of the contract," and shall be dated and signed by a responsible contractor official. These test data copies shall be furnished as specified in 3.3.3.

3.3.3 Product acceptance test data forms.- The contractor shall prepare test data forms for each item subjected to test. The title page for each set of test data forms shall show the item name, national stock number (NSN), type designation and serial number, specification number and date, and the contract number and date. The individual test form shall indicate for each test the applicable specification paragraph number, and the performance limits stated therein. The original test data form shall be signed by the contractor's test person. Copies may be made by use of carbon paper, or by means of a duplicating process. All copies of a given sheet shall carry identical test data. Blank forms shall be typed, lettered by mechanical means, or printed. Two copies of all test data are required. One copy shall accompany the product tested. The second copy shall be furnished to the FAA quality assurance representative. If no FAA quality assurance representative is present, the second copy shall be forwarded to the FAA contracting officer or his designated technical representative.

3.3.4 Measuring and test equipment.- The contractor shall provide and maintain all measuring and test equipment in accordance with MIL-C-45662.

4. QUALITY ASSURANCE PROVISIONS

4.1 Inspection point.- At the descretion of the FAA, inspection may be accomplished at either the repair source or at the FAA Depot. When inspection is accomplished at the repair source, all items shall be subject to inspection and/or verification testing by the FAA's quality assurance representative prior to shipment unless otherwise specified by the contracting officer.

4.2 Inspection criteria.- Repaired items may be subject to either lot-by-lot or continuous sampling plans as determined by the FAA. In either case, the Acceptable Quality Level will be 1.0 percent for critical defects, 5 percent for major defects and 10 percent for minor defects as defined in Appendix 1.

4.3 Rejected items.- Rejected items shall be reworked by the contractor at no cost to the government and be clearly identified as rework when resubmitted for inspection.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery.- The item will be prepared for delivery as provided in the contract.

6. NOTES

6.1 Note on information items.- The contents of this section are only for the information of the initiator of the procurement request and are not a part of the requirements of this specification. They are not contract requirements nor are they binding on either the government or the contractor. In order for these terms to become a part of the resulting contract, they must be specifically incorporated in the schedule of the contract. Any reliance placed by the contractor on the information in these subparagraphs is wholly at the contractor's risk.

6.2 Specified items.- The following items should be specified in the contract:

6.2.1 Performance specifications.- Salient performance characteristics should be specified in the contract when they are not otherwise included in a referenced FAA instruction book, FAA handbook, original manufacturer instruction book, or drawings.

6.2.2 Government-furnished equipment (GFE).- Specify any GFE required to perform necessary tests.

6.2.3 Modifications.- Identify all modifications applicable to the unit to be repaired.

6.2.4 Parts peculiar.- Specify any parts peculiar required to install approved modifications.

APPENDIX 1

10. CLASSIFICATION OF DEFECTS

10.1 Critical defect.- A critical defect is a defect that judgment and experience indicate is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product.

10.2 Major defect.- A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

10.3 Minor defect.- A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.